

ABSTRACT: A hybrid electric vehicle comprises an internal combustion engine, a starter/generator (SG), a motor control module (MCM), a traction motor (TM), a clutch, and a battery. The engine provides power to SG to generate poly-phase alternating current; it also drives the wheels directly when the clutch is engaged. TM drives the vehicle wheels; it also provides braking torque to the wheels and regenerates electric energy from the kinetic energy of the vehicle. TM is a multi-speed poly-phase induction motor and is electrically connected to SG. TM, SG and the clutch together accomplish the function of “changing gear”, and no mechanical transmission is needed. MCM provides alternating current to and control SG and TM to work in their desired modes. The battery stores and provides electrical energy as needed.